

New and True Method

TO FIND THE

533.e.24

LONGITUDE³

Much more Exacter than that of

Latitude by Quadrant.

ALSO,

A New Method for the *LATITUDE*,
Truer abundantly than that by *Meridian*;
And by *Observation of the SUN*, never
before discover'd; and in a plain and fami-
liar Way, for the *Publick Good*, by one who
has been both *Commander and Owner* of se-
veral Vessels.

Proved by *EXPERIENCE*,

And Recommended to publick Consideration,

By *WILLIAM HALL*,

At Mr. *John Crutbars*, the Sign of the *Leg*, in *Thames-Street*, near the *Custom-House*, *LONDON*.

LONDON,

Printed for the *AUTHOR*, 1714.

NEW AND TRUE & IMPROVED

TO FIND THE

LONGITUDE

Which were Hitherto

Latitudes by Quadrant

A 1750

A New Method for the LATITUDE
Found abundantly than that by Astronomical
And by Observation of the SUN never
before discovered; and in a plain and easy
Manner for the People Good, by one who
has been both Commander and Owner of a
Vessel.

Proved by EXPERIENCE

And Recommended to publick Consideration

By WILLIAM HALLEY

A 1750 John Churchill, the Printer, in Pall Mall
LONDON

LONDON

Printed for the AUTHOR, 1750



The Dedication.

TO the most Illustrious Prince,
GEORGE, by the Grace
 of G O D, King of Great Britain,
 France, and Ireland, whom G O D
 long Preserve.

The First Commissioner of the Ad-
 miralty.

The Speaker of the Hon^{ble} House of
 Commons.

The First Commissioner of the Navy.

The First Commissioner of Trade.

The Admirals of the Red, White,
 and Blew Squadrons.

The Master of the Trinity-House.

The President of the Royal Society.

The Royal Astronomer of Greenwich.

The Savilian, Lucasian, and Plumian

(3)
*Professors of the Mathematicks
in Oxford and Cambridge.*

*The Right Honourable Thomas Earl
of Pembroke, and Montgomery.*

Philip Lord Bishop of Hereford.

George Lord Bishop of Bristol.

Thomas Lord Trevor.

*The Honourable Sir Thomas Hanmer,
Bart. Speaker of the Honourable
House of Commons.*

The Honourable Francis Roberts, Esq;

James Stanhope, Esq;

William Clayton, Esq; and,

William Lowndes, Esq;

*Constituted by the Parliament of
Great-Britain, Commissioners for the
Discovery of the LONGITUDE
at Sea; and for Examining, Trying,
and Judging of all Proposals, Ex-
periments, and Improvements relating
to the same.*

*This Method for that Discovery
is (with much Humility) De-
dicated and Submitted by the
AUTHOR.*

GOD to the correction of Longitude; but the
 finding it makes a Substitution of the same Can-
 cel, and GOD most will of his own hand

There are many who have a thousand of
 the Day and Night, and to find out the
 of the Year; and to find out the
 of the Year; and to find out the
 of the Year; and to find out the

New and True Method
 TO FIND THE

LONGITUDE



THE Knowledge we have of
 GOD, by his Essence, is on-
 ly Nominal, not Real; Con-
 fused, not Distinct, from his
 Effects *a Posteriori*. By way
 of Negation; we know what
 he is not, rather than what
 he is. By way of Eminency,
 we know that what Perfection
 is in the Creature, is more
 eminently in Him. By the
 motions of Things, we gather, there must be a chief
 Mover. From the Degrees of Entity, Truth, and Good-
 ness, in the Creatures, we collect there must be one chief
 Entity, Truth, and Goodness; &c. From the Possibili-
 ties, and Contingencies that are in all things, we infer,
 there must be one chief necessary Entity. 'Tis most pro-
 bable that the Angels were created the first Day, because
 when Almighty GOD laid the Foundation of the Earth,
 he was then praised by them, Job the 28th, v. 7. By
 God's Providence both Good and Evil are govern'd, not
 of the fatal necessity of the *Stoicks*, which ties Almighty
 GOD

GOD to the connexion of secondary Causes ; but the christian Fate makes a subordination of the second Causes. To GOD most Free Will, of which he makes use of Voluntarily, not of Necessity ; out of Indulgence rather than Indigence.

The blessed Luminaries have a threefold Use ; to distinguish the Day and Night ; to note the Times and Seasons of the Year ; and to impart their Virtues to inferior Bodies. The whole World is the Looking-Glass of GOD's Power, and is Subject enough for all Men's Admiration in the Universe. Hence we may gather, that as the Earth is immoveable, so its Distance upon the spherical Surface is equal, as from East to West, and from North to South : So Longitude and Latitude are equal Distances. *THE END*

Worthy and Honourable Gentlemen,

Be pleas'd to observe whether or no my New Method of Practice doth not only produce the Longitude but by a Way more Certain, and abundantly more Truer than that of the Latitude, by former Meridional Observations to this Day, and in a Way so very plain, that the meanest Understanding is capable of it.

I have one Step farther, added also, a New Method to find the Latitude, by a Way abundantly more Certain and Truer, grounded upon a solid Foundation, the Observation of the blessed Sun, a Compass that varies not, and a good Watch-Dial, prov'd by Observation, and made exact : By the Help of which blessed Means, the Longitude, or Latitude, are obtain'd for any Place by Sea or Land, in the whole Universe ; and in a Method very extraordinary, never before acquir'd by any Man to this Tide in the World. By both the Observations of the Watch and Dial, as you may observe to one Minute (and indeed each of them) of Time, how much that is less than the Honourable Parliament propos'd, be pleas'd to consider the great Difference, in how much I have exceeded what could be expected in a thing of that nature so intricate, that many Ingenious attempting it, have fail'd in their Attacks, to the great Discouragement of others in the main. A Thing so much long'd for, and desir'd by every Well-wisher to his Country, that for the Publick Good, and the Honour and Safety of the Kingdom, this is humbly offer'd to the solid Judgment and Consideration of every one, as the best of my Endeavours at least.

As

As to the Loss of the Longitude, there is no such thing in Nature, properly speaking; but we have lost, or forgot the Method of using it, if ever we had it. Whilst the Earth, or this Sun endure, the Longitude will still remain the same; it was at first. We describe the Latitude thus: It is a certain Distance upon the Sea or Land, as thus: Suppose a Ship at the Land end, makes its Departure, and sails 8. or Miles, I have made Observation when departed, by the Sun and Dial, and set the Watch to the Time, I now make Observation, as at first, and compare the Time betwixt the Watch and Dial, and find them differ 5 Minutes of Time, that is 60 Miles, which is your true Latitude, and your Distance from your Departure.

And so if you make your Departure due E. 60 Miles, and then find by the difference of Time betwixt the Watch and Dial 5 Minutes of Time, this is 60 Miles your true Longitude, or Easting; and is your true Distance from your Departure, and your true Course, which properly speaking, of the Longitude being lost, may be said to be found, as by a true Way to find it, and use it practically as the Longitude; and which I hope, the World will do me the Justice to own.

This new Method of finding the Longitude and Latitude, is grounded upon this solid Foundation, The difference of Time in distant Places, by Observation of the blessed Sun, the *azimuth* Compass, and a good Watch; if the true Hour and Minute of the Day, at the place where we first departed, can be had; and where the true Hour and Minute of the Day at the second Place where we arrive, can be had; so that then the Longitude, or Latitude, both can and may be found in all Places of the World.

To produce which, suppose you ready to depart for *Virginia*, and making the *Lizard* your Departure; but, in the Morning, you take the Sun's Amplitude, winding by the *azimuth* Compass, to take exactly the Observation when the Center of the Sun's Body cuts the Horizon; so one Minute of Time; then write down, having a good Watch, set truly to the Time, and proceed your Course, until next Morning, and then make Observation thus:

Take the Center of the Sun's Body just as it cuts the Horizon, by the *azimuth* Compass write down truly the Sun to one Minute of Time, and then compare the Watch:

Watch : If it differ 5 Minutes, that is 60 Miles West, your true Longitude is one Degree, and your Distance from your Departure.

After this manner, you may, if you please, proceed a Voyage of a Thousand Leagues; your Compass cannot err, nor the Watch cannot, being it is corrected every time by the Sun and Compass: Every Observation corrects the other, until in a little time, the Watch will correct the Sun to a Minute; and will be so very Exact, as to help the Sun's Observation to one Minute, and tell the Time nicely when to Observe, which could not be done otherways.

When you set your Watch for a Voyage, it should not stand 'till it's down; but be carefully wound up every Day: Nor must the Motion be meddled with, except an Accident happens, and causes it to stand; and then you must Observe by the Sun, and set it, and proceed as before your Voyage.

Suppose you had five Hundred Traverses, and irregular Courses, you proceeded very near your Port, and never made Observation till there, then you take the Compass, and observe truly the Center of the Sun's Body when it cuts the Horizon, and set down the Time to one Minute; then compare with the Watch: If it differs 6 Hours of Time, it then is 90 Degrees Longitude West; and the Sun, when it makes 12 a Clock here, is but 6 a Clock there.

After the same manner you may, if you please, observe by the Sun and Compass, and set your Watch as before, and proceed upon your homeward-bound Voyage; and if your Course be N. or S. it gives you the Latitude abundantly more exacter than by Meridian, which is seldom less than 5 Minutes, sometimes 10, or 15, when the other Way is correctable, if but one Minute of Time.

I hope every one will grant, that a good Watch, when proved True by Observation two or three times by the Sun, may then be brought so exact, as to be correctable at one Minute in 24 Hours. By which means then, this Watch guides the Sun to one Minute of Time; that is, when exactly to set down the Sun's Observation of one Minute of Time, which I hope is enough to satisfy every one.

Take the Center of the Sun's Body just as it cuts the Horizon, by the natural Compass, which is now true, and then compare the

'Tis granted by all solid Judgments, that the Longitude is of this Nature, viz. To discover, in some measure, to the World, a certain way of knowing, in some part, how far we are distant upon the Earth's spherical Surface in Degrees and Minutes, from any known Meridian, East or West, after the same manner as the Latitude. Hence 'tis plain to the World, that the blessed Luminaries are a solid Foundation, that varies not; no, not one Minute of Time, until the Conflagration; And as to the Compass, that is corrected by the Sun's Observation, which corrects both the Watch and Dial, which cannot vary whilst the World stands. As to a Watch, I speak experimentally: I found by a careful Hand, it was capable of being reduced to a greater Exactness by the former Correction.

I have been four Voyages from *Virginia* home; one from *Jamaica*; through the Gulf of *Florida* home; two from *Lisbon* home; one from *Pensylvania*; one from the *Canaries*, where is the Peak of *Tenatif*; and one Voyage in the *Royal Sovereign*, Sir *Ralph Delaval*, Vice-Admiral of the *Flag*; in which Voyages I acquired part of my Experience, particularly in this New Method of Practice, the which I appeal to all the World, if it is not abundantly truer and exacter; in a great measure better, seeing both of the Observations, is to a Minute of Time; and that corrected every next Observation of the Sun successively after the other. 'Tis generally granted by all Observators of Altitudes, that the most advantageous and best of their Attainments, cannot be taken within less than five Minutes of Time; but generally speaking, in the main, when once to five, it is 10 times very often above 10 Minutes. Yes, 15 many times; let the Instrument be Quadrant, Fore-Staff, or Plough; or what other soever.

Whether or no my New Method is better abundantly, for the Exactness and Trueness, in a great degree, being done to one Minute of Time, and plain in the manner any way, that the meanest Capacity is capable of, if he can but see by the Dial the time of Day by the Sun, he will be a Navigator and Mathematician.

Of how much Good this New Method will do to the Publick, let others say, in the change of an Uncertainty for a Certainty; with which is a solid Ground for the general Practice, in a great measure, and capable of great Improvements, in an extraordinary manner, much more

than any People in the World could expect. How imperfect before, a Man with one Eye may see the dark Vail that cover'd their Imperfections, without a Telescope. The Prejudice in the Publick Concern is unaccountable.

Be pleas'd to let the most Curious but prove this Experiment: Let them take the Compass, and by it set a Dial due East and West, and then observe by the Sun, and see exactly the Time of Day, and then set a good Watch to the Time; and then make a Journey 60 Miles into the Country; and then, the next Day, take the Compass and the Dial, and place them as before, due East and West; then make Observation by the Sun of the exact Time of Day, to one Minute; and then compare the Difference of Time with the Watch, and you will find they differ five Minutes in Time, which is 60 Miles, and is your true Longitude West, or one Degree, whether by Sea or Land. And so you may do in all other Cases, generally, either for Latitude, or Longitude, it gives your Distance from your Departure, and to one Minute.

I was maroon'd my self in a Galley from *Jamaica*, in the Gulf near the *Havana*; when we reckon'd to be 20 Miles off in clear Weather, as we were at Dinner upon Deck, being very calm, no Sea at all, we perceived the Ship to grate amongst the Coral Rocks, and looking over-board, saw them very fair: We Sounded, and had, after we were over the Rocks, something more than she drew: We clapt to Anchor, there being nothing but Shoals off in *Les*, which the Current carried us to. We were near two Days before we could warp out again; which was a great Mercy, the least Sea being enough to strand us.

The Curious may try the former Experiment thus, and prove the Truth of it by Land; by measuring the Distance with a Chain, as is customary in Surveying of Land; which will be a full Satisfaction to the most nice Enquirers of this nature, and confirm the Truth of the Fact. After the same manner, if you proceed at Sea 1000 Leagues, whether East, West, North, or South; suppose the Course never so irregular, by *Transits* you have either your Longitude, or Latitude, according to your Course and Distance: (if you have no regard to the Sun's Declination, when in the *Tropicks*, as is generally done, in such Cases of Observation) And you may, if you please, have a whole Voyage at one Observation of the Difference of Time, as you have in one Day's

ay's Work, and with the same Exactness. That in a Voyage you can Observe when you please, 'tis confirm'd by the blessed Sun and Compass, which vary not, therefore must needs be Truest to direct our Course: By all solid Judgments, not to be brought in Comparison with any other Means, that are in Being in the universal Knowledge, seeing they alter not, but are in a certain way of being continued so, by a superior Hand, who has appointed them their Course; and put it out of the Power of all Sublunaries, ever to make them vary one Minute of Time; nor as to their Contrivance in Duration for what they were created; whose Commands are Uncontroulable, and His Decrees Unalterable.

Whether I have the same *Hypothesis of Pralomy*, or *Tybo Brabs*, it matters not in this, so we agree in the main: That is, We allow such Motions in the ordinary Course of the celestial Bodies, as useful in the Case. Since it hath pleas'd Almighty GOD, when He created the World, and order'd the blessed Luminaries their certain Courses, not to be alter'd, and fix'd by His good Providence; hath so fix'd the Earth, as to be immovable. When His Decree is irrevocable, can it be expected, in GOD's ordinary Course of Providence, to alter?

The Knowledge of the Latitude, long discover'd, and Motion of the Heavens; the Egyptians had a Knowledge of them; yet hath not any attained to the Knowledge of the Longitude, in all their *universal Knowledge*; nor can it be expected now to be done, in Manner and Circumstances as the other. Neither must we suppose GOD Almighty to alter his Decrees; nor by his Omnipotent Power, after a miraculous manner to produce the Means. Indeed, it often pleases Almighty GOD to work by *Second Causes*, in the manner of His Proceedings to produce *Real Effects*; as thus: Altho' it pleas'd Almighty GOD in his Providence, to order the attaining the Knowledge of the Longitude, as the Latitude; yet it hath pleas'd Him to give me the Knowledge of Two sure Helps, the *Two secondary Causes*; but no other Way, or Means to attain it.

These *Two secondary Causes*, the *Azimuth*, or *Dial Compass*, and the *Watch*; by which means it is performed, and to Perfection abundantly more Exact, than the Observation by *Quadrant* of Latitude, as will plainly appear to the World. 'Tis ground'd well upon the

Blessed Luminary Motion, both *Durnal* and *Annual*; the Stability of the Earth; the Supposition of the Poles and Meridians; and also the Compass, without variation; (which helps to the Observations) a Dial, and a good Watch for Observation of Time. By the Help of which blessed Means, the Longitude is attainable to a great Nicety; and also the Latitude, in an exacter manner than done upon a Meridian, as thus: That by a *Quadrant* is seldom less than five Minutes; but when that, is ten times above. But by this Observation, to one Minute of Time! So that it's abundantly more Exact, and also much Truer, than any Observation; and must of necessity be of the most general Use in Navigation, to all Practitioners whatsoever; as in the Mathematicks also, the Difference of Time in distant Places, may be useful in Voyages whatsoever in general Practice, by help of Sun's Amplitude, and *Watch*, to produce both Longitude, or Latitude, how much more exactly than by other ways, let the World judge, and all solid Persons whom it concerns.

As to what can be objected against the Uncertainty of a Watch, let these be pleased to know, it is Corrected by the Sun and Compass, which, in two or three Settings, may be brought to be so very Exact, as not to have any discernable Fallure in 24 Hours: And when it's once brought to that, I hope it will be sufficient.

As to the *Change of Weather*, I have found it very insignificant: An ordinary Watch, with a Minute Motion, will do, and is easily secured in Sea. And as to the *Certainty of the Compass*, it is guided by the Sun. And by this *New Way of Observation*, (being more exact, and truer than former Practices) Corrects all former Methods of Meridian Observations, and others, of what nature soever.

Now, whether this Method be Practicable, and Safe, or not, let the World judge: And whether ever any made the like Discovery, until now that it pleased Almighty GOD, to enlighten the Understanding of me, a poor Worm, instrumental by solid Judgment, to Discover this *New Practical Method*; for which I Bless His most glorious Name, for withdrawing that Vail of Unhappy Darkness, that so clouded all Men.

As to the Use of *Watches*, I speak by true Experience: I had one, which I kept a considerable time at Sea, with little Trouble, to my great Satisfaction in the *Practical*

Part,

Part, as well as in the *Maze*, by the Readiness of its Motion, when well fix'd at first, in all Seasons whatsoever, beyond any Man's Expectation is the World.

'Tis plain, by Experience, that the Longitude is attainable; and, by the Sun's Observation, in a more exact manner than Latitude by *Quadrants*: And also, a *New Way* to find the Latitude, abundantly more Exact than the other by Meridian Observations.

So sure as the Sun is in the Heavens, so sure it makes its Revolutions round the World every 24 Hours, that those People that are *Antipodes* to us, when 12 a Clock in the Day with us, is 12 a Clock in the Night with them. So those that are Six Hours Difference of Time Westwards from us, when the Sun rises at Six a Clock with us, it is Twelve a Clock with them; and so proportionably round the World. 'Tis plain to every one, that your Departure must be the Place where you last abode always; from which, directing your Course, let it be *East, West, North, or South*, as you think fit, according to your Course and Distance; you have very exactly either your Longitude, or your Latitude, according to the nature of the thing; which leads you, as with a *Crew*, from one Step to another, until you complete the Voyage: And so from one Voyage successively to another, as you please, by the computation of the Difference of Time in distant Places: how far we are distant in *Degrees* and *Minutes* upon the spherical Surface, from our Port to another.

I have made it my Business to find such an Instrument, as to stand Proof against all Objections in the Universe, which, I thank GOD, I have found to be useful in Observation of the Sun, to attain either the Longitude, or Latitude; and may be done at any time of the Day, when the Sun shines, minding always to place them by a Compass due East, minding to the Variation also. It is like a plain *Dial*, with *Orations*, in Degrees and Minute; with which you can be more Exact, than with the *Azimuth Compass* abundantly.

Since I have found the *New Instrument*, I find a more easy way of Practice, in a very plain manner, that the meanest Capacity may comprehend. It can be done, either by a *Watch*, and one *Dial*; or, by two *Dials*, without the *Watch*, as in former Examples of the *Azimuth Compass* and *Watch*. Indeed, with the *Dials* you can observe any time of the Day when the Sun shines, with the

the *Watch*, you can Observe both Night and Day, and the Sun corrects itself until no failure appear. Suppose you take one Instrument, or *Dial*, and one good *Watch*, winding it up; and then setting the *Dial* by the Compass due E. and W. and then see what's a Clock to one Minute: If 8 by the *Dial*, let the *Watch* exactly to 8; and then suppose your self taken away, and blinded, your Ears stop'd; and not permitted to ask Questions, carried in the Hold of a Ship, Distance 60 Miles E. W. N. or S. and then to be set at Liberty, to tell how far they have carried you and which Way. I humbly offer my Person, as aforesaid, either in a *Vessel* by Sea, or in a *Coach* by Land; and be further subject to all such Gentlemen, as shall be appointed in the Management of the Affair; and will be ready in 24 Hours Notice: Which will soon appear to the World, whether or no I shall find the Longitude, or Latitude.

I now suppose you very Desirous of a satisfactory Answer, as to the Longitude. In order: Suppose your Distance 60 Miles carried, you must Observe as before: First set your *Dial* exact by the Compass due E. and W. and then see by the Sun, what Time of Day. Suppose to a Clock; then compare the Time with the *Watch*, and they will differ 5 Minutes of Time; which is your Longitude; and is 60 Miles, or one Degree, whether E. and W. And if N. or S. is doth the same. And if you are carried N. E. N. W. S. E. or S. W. after that manner it gives you according to your Course and Distance, one Half Longitude, the other Latitude.

And, after this manner, you may proceed a Voyage of 1000 Leagues; and if you have 1000 Travellers, and your Courses never so irregular, it gives to one Minute, your Longitude, or Latitude. It either gives you a whole Voyage at once, or every Day's Work, as you please your self. By which means, a Man may soon see, at any time, when he's near Danger, by fore-seeing timely the Difference of Time, which (I pray GOD) may be helpful to the Publick Good.

The Sun (as I have said before) makes its Course round the World, once in 24 Hours; and a quarter-part in six Hours; and so proportionably, every Degree 5 Minutes of Time, or 60 Miles by calculation. As thus: Suppose you Travel due W. 60 Miles, first making Observation by the Sun, with the *Dial*, and setting exactly to the Time of Day, the *Watch*; and when come to your Journey's end, you then make Observation as before, by the

the *Sun*, the *Dial*, and *Watch*; and then compare the Difference of Time, and you will find them differ five Minutes of Time, which is your Longitude *West*; and is 60 Miles, or one Degree; and so more or less. And after the same manner you have the Latitude; *viz.* For every five Minutes Difference of Time in Observation, betwixt the *Watch* and *Dial*, you must compute 60 Miles, or Minutes; and so proportionably, more or less, whether Longitude, or Latitude, it is all one in the main. After this way, you may proceed in a Voyage round the World. If it were in the *Royal Sovereign*, I would (by *GOD's* Permission) engage my Life, to Navigate her by this New Method of Practice.

Whether or no the Method of Guns, or any Fire-works, that can produce *Light* and *Sound*; or the *Horologia* proposed; or any other Method whatsoever, can be brought under Denomination of Comparison; or whether ever any before made such a general Discovery as this; or that I have any Right to the Reward for such Person as should discover a better Method of finding the Longitude, I appeal to the *Wisdom* and *Justice* of the Honourable Commissioners; the *Nicety* expected by the *Parliament* being, To shew a Method by Observation of Longitudes, to Half a Degree, or Thirty Geographical Miles.

Note, That he that being taken, blinded, and carried away in the Hold of any Vessel 60 Miles off, and when set at Liberty, can tell how far they have carried him, and which Way, can as easily tell if he is carried 1200 Leagues. As thus, Suppose myself in London, write down my Long. and Lat. and then I take a Compass, and by it set the Dial due E. and W. and observe by the Sun what Time of Day; then exactly set the Watch to the Time, and suppose me carried to Virginia, in the Hold of a Ship, and not permitted to see. But then releas'd - immediately take the Compass, and by it I set the Dial due E. and W. and then see to one Minute the Time of Day, and then compare very exactly the Time with the Watch. When I am carried as far W. westerly as Virginia, the Watch will differ 2 Hours of Time; (that is, 9 a Clock here, is but 6 there) which 2 Hours of Time, reduced by 5, tells the Longitude W. West, and gives you Difference of Latitude, and Distance from Departure; which then shews by which Course you came, you have about 1200 Leagues; and it shews to direct you back again. When you are in Virginia, you must set down the Longitude and Latitude; and must mind to set the Dial due

the East and West, then observe what Time of Day the Sun is at the Point, and to the Time which the Sun is at the Point, always adding every Day to what is up, never letting it down, and observing never to make any mistake, till the Point is over, and then you shall the Distance. You may, if you will, observe by the Sun, Dial, and Compass, as often as you please, and compare the Difference of Time with the Watch, which gives you every Day's Work in one Minute of Time. And if you Observe but once, it is as well.

The solid Ground for this my New Practical Method, is the Annual and Diurnal Motion of the Sun: For as every Ship that makes its Departure from its Place, is marked or lost, until Enquiry be made. But now is hath pleased GOD to show me which way, by Observation of the Sun, how any Master may find himself, and his Longitude, or Latitude, and besides, tell your exact Distance from your Departure, and show your true Course.

I hope none so *Unbelieving* as to Doubt my Assertion: But if there should be any Unbelieving Person, let him feel the Iron Chain of Allegation, as provided for our use: that he may not be *misled*, but *Believe*, or Disbelieve my Assertion, as will.

I advise one Watch, and one other Instrument, or Dial, rather than two of any sort: Let it be 12 Inches over, and graduated in Hours, and Minutes of Time, reversed, that that you may see the Watch and Dial any Time of Day: You shall be able to Observe the same Hour any Day, if you can, by the Dial: but you may Observe any Time of the Day by the Sun, if you mind to allow the Time which. If you let the Watch and Dial at 4 o'Clock the first Day, and then you Observe at 5, which differs one Hour of Time from the Day, than *Yesterday*, which must be allowed unequal your Time of the Dial, and Watch: and then what Difference of Time between the Watch and Dial, is your true Longitude, or Latitude. But you must always mind the second Observation, to make a proportionable Allowance for every Hour, more or less, as it happens any Time of the Day, before or after the first seeing.

If I have any Regard, or Reward for what is here discovered, I'll Print another Book, demonstrating both Long and Lat. to one Min. by the Moon, and almost any of the Stars, when visible: and also how the Distance, taken from your Departure to the Mile: and what Course sailed, by the Compass, in a plain way, more exact than the Observation by Quadrant upon Meridian, by the Sun.